several specimens to insure enough tissue for adequate examination. Fluoroscopy should be used when one attempts to take a biopsy specimen of a well-localized lesion seen on an x-ray film of the chest.

Pneumothorax does occur (in 10 percent of cases, or less), occasionally requiring chest tube insertion. Although significant hemoptysis is rare, bleeding severe enough to require open thoracotomy to resect or ligate the bleeding site has been reported and some fatalities have occurred. Careful attention to technique will limit these problems. Biopsies done in the right middle lobe and lingula have an increased risk of pneumothorax. The procedure is contraindicated in patients with pulmonary hypertension or bleeding disorders. The inability of a patient to cooperate is a distinct disadvantage, but only constitutes a relative contraindication.

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Corticosteroid Aerosols in the Treatment of Asthma

IN PATIENTS with sputum or blood eosinophilia and recurrent attacks of bronchospasm, the use of corticosteroids may be very helpful. Unfortunately, the use of orally given steroids such as prednisone, when taken for other than a short course, may lead to significant systemic side effects. Such problems as a "moon face," prominent bruising, osteoporosis, and adrenal gland suppression are well recognized complications of corticosteroid therapy.

The use of aerosolized steroids in treating asthma is not new. Dexamethasone (Decadron®) has been used as an inhalant for many years. However, the use of dexamethasone as an aerosol also may result in significant systemic side effects.

The aerosol administration of several newer corticosteroid preparations (beclomethasone dipropionate, triamcinolone acetonide and betamethasone valerate) has resulted in the benefits of steroid therapy without adverse systemic effects. In the small doses used, there is no development of significant systemic levels of corticosteroid, and adrenal function is not impaired.

The use of these new steroid aerosols has allowed patients who were dependent on large doses of oral steroids to reduce their dose to a reasonable daily level, for example, less than 10 mg of prednisone per day, and in some cases to an alternate-day regimen, thereby minimizing systemic side effects. Many patients are able to avoid systemic (orally taken) steroids completely by inhaling one of these new preparations.

The only significant adverse effect of these new steroid aerosols has been the occasional development (in approximately 5 percent of patients) of a Candida infection of the oropharynx, which responds to a reduction in dosage of the inhaled steroid along with nystatin (Mycostatin®) mouth rinse or amphotericin B lozenges. Some patients have complained of hoarseness, which improves rapidly after the steroid therapy is stopped. This hoarseness usually can be prevented by rinsing the mouth with water after each use.

In patients who have been receiving steroids for long periods, allergic rhinitis and eczema may recur and adrenal insufficiency may develop as the oral administration of steroids is discontinued. During an exacerbation of bronchospasm, such as with infection or heavy exposure to allergens, a short intensive course of systemic corticosteroids sometimes may be necessary.

Beclomethasone dipropionate (Vanceril®) is now available in cartridge-inhaler form in the United States, and is a significant addition to the therapeutic armamentarium of physicians treating patients with reversible airway obstruction.

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Cystic Fibrosis

CYSTIC FIBROSIS has been considered primarily a pediatric problem, although approximately 25 percent of patients now survive into their second decade of life. In addition, in some patients overt symptoms of the disease do not appear until young

adulthood. Consequently, physicians who primarily treat adults should be aware of this diagnosis in their evaluation of young adults with chronic pulmonary or intestinal problems.

Cystic fibrosis is inherited through an autosomal recessive gene for which analysis of sweat sodium or chloride, or both, is the key diagnostic test. A sweat chloride value (obtained by pilocarpine iontophoresis) over 60 mEq per liter usually is diagnostic of cystic fibrosis. Nasal polyposis, chronic bronchitis, bronchiectasis, evidence of pancreatic insufficiency or a family history of cystic fibrosis in a sibling are all indications for carrying out a sweat test. Pancreatic and pulmonary manifestations need not both be present in a patient to warrant a workup for cystic fibrosis because many patients are seen with either one or the other of these major manifestations.

The detection of heterozygous carriers of the cystic fibrosis gene still remains an important research problem, since genetic counseling depends on the availability of such a test. A factor that causes ciliary dyskinesia with rabbit tracheal cultures or oyster gills can be detected in homozygous and heterozygous blood, but this has not been entirely reliable for detecting the carriers. Other procedures are being investigated; one method that shows promise detects the carrier state by showing an abnormal response of protein, B-glucuronidase or ribonucleic acid (RNA) methylation in cultured lymphocytes to a stimulus by phytohemagglutinin. Cystic fibrosis is a genetic model that may be the key for understanding the pathogenesis of various chronic lung diseases, including chronic bronchitis and bronchiectasis.

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Smoke Inhalation and Respiratory Failure in Burn Injury

RESPIRATORY FAILURE is the most common cause of death following burn injury. Many factors contribute to this problem, one of which is smoke inhalation. The diagnosis of smoke inhalation is made on the basis of soot-laden sputum production which often persists for several days after the injury. Carboxyhemoglobin levels over 15 percent indicate significant smoke inhalation, although carboxyhemoglobin may have largely disappeared by the time the first measurement is made. The major effects of smoke inhalation are seen on respiratory epithelium of the conducting airways. Stridor and laryngeal edema, bronchorrhea, persistent cough and all the findings of small airway obstruction from mucosal edema may occur. This damage is not inflicted by heat or carbon particles, but rather by toxic volatile gases liberated during incomplete combustion. For this reason smoke inhalation damage is rare following accidents with gasoline, kerosene, alcohol or other flammable liquids, but is commonly associated with the burning of upholstery, paint, wood and similar substances.

Respiratory effects of smoke inhalation occurring without surface burns are mild. Major smoke inhalation often is associated with brain damage and severe metabolic acidosis resulting from impaired oxygen delivery caused by the presence of carboxyhemoglobin. If the patient survives the injury without brain damage, respiratory complications are minimal. Smoke inhalation should be treated with 100 percent oxygen breathing until carboxyhemoglobin is less than 10 percent, metabolic acidosis has cleared or brain function is normal. Hoarseness or stridor usually will improve with administration of 4 mg of dexamethosone, repeated if necessary. Humidification of inhaled air is continued as long as sputum production is heavy. Bronchodilators are indicated if bronchospasm occurs. The patient may cough up soot-laden sputum and shreds of bronchial mucosa for several days. Inpatient care should be continued until the sputum is clear. Endotracheal intubation or tracheostomy rarely is necessary. Prompt fiberoptic bronchoscopy is advised to diagnose the degree of airway inflammation. Bronchoscopy is indicated also if there are signs of major airway obstruction with mucous plugs, but this rarely is necessary.

Pulmonary capillary leakage, alveolar atelectasis, interstitial edema and finally bacterial pneumonitis is a common sequence of events in patients with burns involving more than 60 percent of the body surface area. Smaller burns usually are not associated with pulmonary complications unless there is concomitant smoke inhalation. The com-